Outline

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1. DPCS mission

“Our group is focused on the building of decentralized distributed systems at different scales (small groups, clusters or Internet) and parallel systems. In particular, we pay special attention to peer-to-peer paradigms, message passing and grid computing. In addition, we also focus in the analysis and evaluation of collaborative interactions in Virtual Learning Environments. Finally, we are interested in the development of collaborative applications.”
3. Full-members and main expertise

Dr. Thanasis Daradoumis
Collaborative Systems

Dr. Joan M. Marquès
Distributed Systems

Dr. Josep Jorba
Parallel Programming

Dr. Santi Caballé
Collaborative Systems

Dr. Ferran Adelantado
Cognitive Networks

Dr. Xavi Vilajosana
Distributed Systems

Dr. Angel A. Juan
Computer Simulation

Dani Lazaro
Distributed Systems

Jordi Llosa
Cognitive Networks

Revisar que està correcte
3. Research lines: Contributory distributed systems

- **Goal:** Enable the creation of contributory communities: communities with resources provided by its participants.

- **Keywords:** contributory systems, service deployment, resource discovery, peer-to-peer architectures

- **Methodology:** by developing mechanisms for deploying services in a decentralized manner using contributed resources.

- **Techniques:** replication, optimistic protocols, weak consistency, distributed hash tables,

- **Technology:** Java, FreePastry,

- **Corresponding researchers:** Joan Manuel Marquès & Daniel Lázaro

- **Recent developments:** An architecture and best-effort mechanism for service deployment in contributory systems

- **Selected related publications:**
3. Research lines: Evaluation of Distributed Apps

- **Goal:** Develop a framework to evaluate distributed applications using live deployment environments
  - Live deployment: Real software runs on real machines connected to real network
  - Live deployment allows developers testing aspects of an application that can not be easily tested by simulation or emulation

- **Keywords:** distributed systems, distributed application management, distributed systems evaluation

- **Methodology:** by developing mechanisms for synchronization and coordination and by managing the deployment of distributed applications

- **Techniques:** synchronization, replication, optimistic protocols, weak consistency, consens, ...

- **Technology:** Java, PlanetLab

- **Corresponding researchers:** Joan Manuel Marquès

- **Recent developments:** PlanetLab@UOC project: use of PlanetLab to evaluate practices from distributed systems courses in realistic environments

- **Selected related publications:**
3. Research lines: Resource Allocation Algorithms

- **Goal:** Auction based resource allocation.
  - Resources are priced and allocated to those who value them most.

- **Keywords:** Resource allocation, auctions, economic models, time-differentiated resources.

- **Methodology:** design efficient algorithms by means of economic models.

- **Techniques:** heuristics, simulation, probabilistic methods, constraint programming, parallel programming, distributed systems, cloud computing, etc.

- **Technology:** Java, C/C++, CUDA, BOINC, LaColla, …

- **Corresponding researchers:** Xavier Vilajosana

- **Recent developments:** Multi-lane double auction mechanism

- **Selected related publications:**
3. Research lines: Context Aware

- **Goal:** Control and configuration of Wireless Sensor Networks (WSN) through Context Aware Systems.
  - Context Modeling.
  - Matching of user preferences’ to the control and configuration of WSN.
  - Dynamic control and configuration algorithms for WSN taking into account the context.

- **Keywords:** Resource modeling, WSN, Control mechanisms, Data aggregation.

- **Methodology:** Matching of user preferences’ to the control and configuration of WSN

- **Techniques:** heuristics, probabilistic methods, constraint programming, distributed systems, WSN, etc.

- **Technology:** Java, C/C++, TinyOS

- **Corresponding researchers:** Jordi Llosa, Xavier Vilajosana, Joan Manuel Marquès

- **Recent developments:** Ph.D thesis in progress.
3. Research lines: OS Scheduler

- Goal: Energy efficient task scheduling for multi-task OS for embedded devices.
  - Event-based OS vs Multi-task OS
  - Evaluation of Energy efficient Scheduling
    - Completely Fair Scheduler (CFS)
    - Lottery Scheduling
    - Economic Schedulers (Auctions)

- Keywords: Task Scheduling, Embedded Devices

- Methodology: Study efficient schedulers. Enhancement based on economic models.

- Techniques: heuristics, probabilistic methods, optimization, auctions, distributed systems, embedded, etc.

- Technology: Java, C/C++, TinyOS, Contiki, MicroC

- Corresponding researchers: Xavier Vilajosana, Jordi Llosa, Joan Manuel Marquès

- Recent developments: Master thesis in progress.
3. Research lines: Routing/Scheduling algorithms

- **Goal:** to develop new hybrid algorithms for solving routing/scheduling problems.

- **Keywords:** vehicle routing problems, scheduling heuristics, simulation, parallel programming, distributed systems

- **Methodology:** by combining techniques from Computer Science and Operations Research to design efficient algorithms and to generate software for small and medium enterprises.

- **Techniques:** heuristics, simulation, probabilistic methods, constraint programming, parallel programming, distributed systems, cloud computing, etc.

- **Technology:** Java, C/C++, CUDA, BOINC, LaColla, …

- **Corresponding researchers:** Angel A. Juan & Josep Jorba

- **Recent developments:** The SR-GCWS-CS algorithm for the Capacitated Vehicle Routing Problem

- **Selected related publications:**
3. Research lines: Learning Grid

- **Goal:** to develop semantic description and matchmaking of learning grid services, automatic composition of learning grid portlets, and virtual laboratories portals as ubiquitous, pervasive and collaborative learning tools.

- **Keywords:** learning grid; semantic web; learning/Web services; Virtual Labs; Ontologies; Collaborative Learning Tools; Personalized E-Learning

- **Methodology:** by combining techniques from Grid computing, semantic modeling of distributed learning services, collaborative learning and personalization, employing syntactic and semantic approaches/conceptual models, web services discovery, invocation and composition, and an ontological model.

- **Techniques:** syntactic/semantic composition of services, Web service description, orchestration or choreography for service composition, pervasive and ubiquitous computing, etc.

- **Technology:** BPEL, WSMO, WSML, RDF, DAML+OIL, OWL, …

- **Corresponding researchers:** Josep Jorba, Thanasis Daradoumis, Gustavo Gutiérrez

- **Recent developments:** A model that can be used for automatic composition of Learning Grid Portals; an infrastructure model for the design of ubiquitous and pervasive virtual laboratories.

- **Selected related publications:**
  
3. Research lines: Distributed Decentralized Collaborative Learning

- **Goal:** to develop decentralized online learning systems for task accomplishment during online collaborative learning process with the aim to overcome the limitations of centralized systems, such as maintenance cost, lack of scalability and having a single point of failure.

- **Keywords:** P2P Systems, JXTA Library, PeerGroup Management, Groupware Tools

- **Methodology:** by using students’ own computational resources to form P2P systems.

- **Corresponding researchers:** Santi Caballé, Thanasis Daradoumis

- **Recent developments:** JXTA-Overlay (http://jxta-overlay.dev.java.net)

- **Selected related publications:**
3. Research lines: Interaction analysis, learning design and adaptive learning

- **Goal:** to develop methods and tools for collaborative interaction analysis, CSCL ontology and script, learning design through collaboration strategies, adaptive learning and adaptive collaborative support.

- **Keywords:** Interaction analysis, learning design and adaptive learning

- **Methodology:** by using CSCL methodology, data analysis techniques.

- **Techniques:** quantitative/qualitative techniques, Natural Language Processing, collaboration strategies

- **Technology:** Java, multi-agent systems, Ontology-based and Social Network Analysis, XML.

- **Corresponding researchers:** Thanasis Daradoumis, Angel A. Juan, Santi Caballé, Luis Casillas

- **Recent developments:** An environment for the quantitative/qualitative analysis of collaborative interactions in an online collaborative platform.

- **Selected related publications:**
3. Research lines: Monitoring e-Learning

- **Goal:** to develop information models and systems that contribute to improve e-learning monitoring and assessment.

- **Keywords:** Computer-supported collaborative learning, data analysis

- **Methodology:** by using CSCL theory and data-analysis techniques to provide real-time critical information to instructors in online learning scenarios.

- **Techniques:** data analysis, data visualization, statistics, web services, collaborative systems, information systems.

- **Technology:** Java, Collaborative systems, …

- **Corresponding researchers:** Angel A. Juan & Thanasis Daradoumis

- **Recent developments:** The SAMOS project

- **Selected related publications:**
3. Research lines: Computer-Supported Collaborative Learning & Mobile-Learning

- **Goal:** To enhance and improve the collaborative learning experience in online environments from anywhere and at anytime.

- **Keywords:** collaborative learning, information management, scaffolding, evaluation, mobility, mobile devices, ubiquity, pervasiveness

- **Methodology:** by using interaction data analysis with the help of computers and portable technology for the support of scaffolding, evaluation and ubiquitiness in CSCL environments.

- **Corresponding researchers:** Santi Caballé, Thanasis Daradoumis

- **Recent developments:** Discussion Forum project (http://clpl.uoc.edu/df)

- **Selected related publications:**
4. Main Research Projects


• **mosaicLEARNING**: Mobile, open-source, standards-based & secure, context-Aware, individualized, collaborative eLearning, 31/12/2005 - 31/12/2008, Spanish Ministry of Science and Technology (TSI2005-08225-C07-05)


• **The Virtual Math Teams Project (VMT)**, 1/11/2004 - 1/11/2009, National Science Foundation (NSF-NSDL) grant #0333493, USA
4. Main Research Projects


- **Grid4ALL**: Self-* Grid: Dynamic Virtual Organizations for schools, families, and all, 1/06/2006 - 1/06/2009, CEE - VI Framework Programme (IST-2006-034567)

- **National Network of e-Science**: Equipamiento e Infraestructuras de investigación científica y tecnológica, 1/10/2007 – 31/12/2010, Spanish Ministry of Science and Technology (CAC-2007-52)

- **Thematic Network** for the coordination of middleware activities in Grids, 1/10/2006 - 1/10/2007, Spanish Ministry of Science and Technology (TIN2005-25849-E)

5. Academic activity

- UOC Computer Science & Telecommunication degrees:
  - Distributed Systems
  - Computer-Supported Collaborative Learning
  - Computer Networks
  - Computer Simulation
  - Operations Research
  - Multivariate Data Analysis

- UOC PhD program:
  - Research Methodologies
6. Other data

- **Research stays:**
  - Thanasis Daradoumis: University of the Aegean – 2 years
  - Santi Caballé: UC Berkeley, USA – 6 months
  - Joan Manuel Marquès: Orange - France Telecom R&D, París, France – 8 months

- **Edited books:**
6. Other data

• **Conferences/Workshops organised:**
  - International Workshop on Adaptive Systems for Collaborative Learning (IWASCL 2009, Barcelona)
  - International Workshop on Collaborative e-Learning Systems and Applications (CESA 2008, Barcelona)
7. More info

Please visit our web page at http://dpcs.uoc.edu